

claims

What is claimed is:

- 5 1. A tunable power amplifier comprising:
 - a power amplifier;
 - a ferro-electric tunable component coupled to the power amplifier;
 - a power amplifier output matching circuit coupled to the power amplifier, having an impedance and comprising the ferro-electric tunable component;
 - a control line operably coupled to the ferro-electric component;
- 10 a control source electrically coupled to the control line, the control source configured to transmit a control signal on the control line;
 - wherein the ferro-electric component, responsive to the control signal, adjusts the impedance of the matching circuit.
- 15 2. The tunable power amplifier of claim 1, wherein the ferro-electric tunable component comprises a ferro-electric tunable capacitor.

3. The tunable power amplifier of claim 2, further comprising a substrate wherein the capacitor is directly mechanically coupled to the substrate and the power amplifier is directly mechanically coupled to the substrate.
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4. The tunable power amplifier of claim 3, wherein the output matching circuit further comprises a second ferro-electric tunable component.
5. The tunable power amplifier of claim 4, wherein
10 the second component comprises a tunable ferro-electric capacitor.
6. The tunable power amplifier of claim 1, wherein the matching circuit comprises:

15 a first tunable ferro-electric capacitor coupled at a first end of the first capacitor to an output of the power amplifier and to ground at a second end of the first capacitor;
- 20 an inductive element coupled at a first end of the inductor to the first tunable capacitor and to the power amplifier, and;
- a second tunable ferro-electric capacitor coupled, at a first end of the second capacitor to

a second end of the inductive element and to ground at a second end of the second capacitor; wherein, the ferro-electric component comprises one of the ferro-electric tunable capacitors.

- 5 7. The tunable power amplifier of claim 6, wherein the inductive element comprises a lumped element inductor.
- 10 8. The tunable power amplifier of claim 6, wherein the inductive element comprises a microstrip.
9. The tunable power amplifier of claim 6, further comprising:
 - 15 a second inductive element coupled at a first end of the second inductive element to the second end of the first inductive element;
 - a third ferro-electric tunable capacitor coupled at a first end of the third capacitor to a second end of the second inductive element and at a second end of the third capacitor to ground.
- 20 10. The tunable power amplifier of claim 9, wherein the second inductive element comprises a lumped element inductor.

11. The tunable power amplifier of claim 9, wherein
the second inductive element comprises a
microstrip.

12. A method of tuning an impedance match of a power
amplifier comprising:

5 generating a control signal;
 coupling the control signal to a ferro-
electric component;
 changing an impedance of the component,
10 responsive to the control signal;
 changing the impedance match of the power
amplifier responsive to changing the impedance of
the component.

13. A wireless communication device comprising:

15 a battery;
 a transceiver;
 a user interface;
 a housing encasing the battery and the
transceiver and adapted to present the user
20 interface external to the housing;
 a power amplifier;
 a ferro-electric tunable component coupled to
the power amplifier;

a power amplifier output matching circuit coupled to the power amplifier, having an impedance and comprising the ferro-electric tunable component;

5 a control signal generator for generating a control signal;

a control line coupled to the control signal generator and to the ferro-electric component;

10 a control source electrically coupled to the control line, the control source configured to transmit a control signal on the control line;

wherein the ferro-electric component, responsive to the control signal, adjusts the impedance of the matching circuit.

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